UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)
(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
11P083162

Total Pages in this Submission

TO THE ASSISTANT COMMISSIONER FOR PATENTS
Box Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

SOFTWARE PORTABLE TELEPHONE SET

and invented by:

Masataka Mitama

If a CONTINUATION APPLICATION, *check appropriate box and supply the requisite information:*

☐ **Continuation**   ☐ **Divisional**   ☐ **Continuation-in-part (CIP)**   of prior application No.: _____

Which is a:

☐ **Continuation**   ☐ **Divisional**   ☐ **Continuation-in-part (CIP)**   of prior application No.: _____

Which is a:

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Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below

2. ☒ Specification having _____15_____ pages and including the following:

   a. ☒ Descriptive Title of the Invention

   b. ☐ Cross References to Related Applications *(if applicable)*

   c. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*

   d. ☐ Reference to Microfiche Appendix *(if applicable)*

   e. ☒ Background of the Invention

   f. ☒ Brief Summary of the Invention

   g. ☒ Brief Description of the Drawings *(if drawings filed)*

   h. ☒ Detailed Description

   i. ☒ Claim(s) as Classified Below

   j. ☒ Abstract of the Disclosure

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Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*

    a. ☒   Formal   Number of Sheets   4 (Figs. 1-4)

    b. ☐   Informal   Number of Sheets

4. ☒ Oath or Declaration

    a. ☒   Newly executed *(original or copy)*   ☐   Unexecuted

    b. ☐   Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*

    c. ☒   With Power of Attorney   ☐   Without Power of Attorney

    d. ☐   *DELETION OF INVENTOR(S)*
          Signed statement attached deleting inventor(s) named in the prior application,
          see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*
    The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Computer Program in Microfiche *(Appendix)*

7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*

    a. ☐   Paper Copy

    b. ☐   Computer Readable Copy *(identical to computer copy)*

    c. ☐   Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☒ Assignment Papers *(cover sheet & document(s))*

9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*

10. ☐ English Translation Document *(if applicable)*

11. ☐ Information Disclosure Statement/PTO-1449   ☐   Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Acknowledgment postcard

14. ☐ Certificate of Mailing

    ☐   First Class   ☐   Express Mail *(Specify Label No.):*

P01ULRG/REV04

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Accompanying Application Parts (Continued)

15. ☒ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
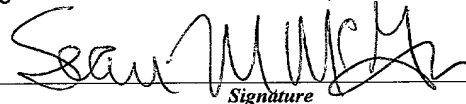
16. ☐ Additional Enclosures *(please identify below):*

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	15	- 20 =	0	x $18.00	$0.00
Indep. Claims	2	- 3 =	0	x $78.00	$0.00
Multiple Dependent Claims (check if applicable) ☐					$0.00
				BASIC FEE	$690.00
OTHER FEE *(specify purpose)*			Assignment Recordation		$40.00
				TOTAL FILING FEE	$730.00

☒ A check in the amount of $730.00 to cover the filing fee is enclosed.

☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. 50-0481
as described below. A duplicate copy of this sheet is enclosed.

   ☐ Charge the amount of   as filing fee.

   ☒ Credit any overpayment.

   ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.

   ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance,
       pursuant to 37 C.F.R. 1.311(b).

Signature

Dated: **March 22, 2000**

Sean M. McGinn, Esq.
Registration No. 34,386

cc:

Customer No. 21254

P01ULRG/REV04

APPLICATION
FOR
UNITED STATES
LETTERS PATENT

APPLICANT: MASATAKA MITAMA

FOR: SOFTWARE PORTABLE TELEPHONE SET

DOCKET NO.: 11P083162

SOFTWARE PORTABLE TELEPHONE SET

BACKGROUND OF THE INVENTION

The present invention relates to a software portable telephone set and, more particularly, to a
5 software portable telephone set capable of coping with a plurality of different radio systems with the same hardware structure by emitting reconfiguration afresh and also mounting and demounting for each system.

In a software radio unit, signals which are
10 received and to be transmitted are converted in an A/D and D/A converters from analog to digital signal and vice versa, respectively, so that digital signal processing is performed as much as possible in the radio unit. Digital signal processing is performed according to a
15 software program. This means that the content or function of the signal processing can be changed by replacing the software. It is thus possible to readily cope with a plurality of different radio systems with the same hardware structure by changing programs.

20 However, when it is intended to apply such software radio techniques to portable telephone sets, the following problem is encountered. To be able to cope with a plurality of different systems, wide-band active and passive components are necessary. Usually, the
25 expanding the frequency band coverage of components results in characteristics deterioration. Particularly, deterioration of the transmission side characteristics due to frequency band coverage increase

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directly influences the performance of the portable telephone set, and this is a great barrier in the realization of software portable telephone sets.

While the above software radio techniques require wide-band passive and active components to be able to cope with a plurality of different systems. Usually, the characteristics of the active and passive components are deteriorated with frequency band coverage increase. Particularly, it is really difficult to maintain high efficiency of a transmitting power amplifier, which is one of the main function components of the transmitting side part, over a wide frequency band. It is also really difficult to increase, with low loss, the frequency band coverage of transmission signal filters and isolators. Deterioration of characteristics of the transmission side components poses problems in the portable telephone set that allowed time of use is reduced and that the size of the portable telephone set body is increased, thus greatly spoiling the commercial value of the software portable telephone set.

SUMMARY OF THE INVENTION

The present invention has been for solving the above drawback, and it has an object of providing a software portable telephone set, which have resort to reconfigurable circuit techniques to be able to cope with a plurality of different systems while holding the same hardware structure and permit, with a detachable transmitting function, the selection of best performance

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power amplifier and other components for each system, so that it is suited for frequency band coverage increase.

According to an aspect of the present invention, there is provided a software portable telephone set comprising a detachable transmitting function and transmitting and receiving circuits capable of being reconfigured afresh with software updating, wherein the transmission system is reconfigured afresh in relation to the mounting and demounting of a transmitting function part. According to the above invention, it is possible to provide a transmission part suitable to each system. Further, a wide range bandwidth transmission and reception operations are possible by coping with a plurality of systems with the same hardware construction.

The transmitting function is provided by a detachable module for transmitting a modulator output analog signal. According to this, it is possible to select an optimum module for each system to realize an optimum transmission without degrading the characteristic of the transmission parts.

The transmitting and receiving circuits have a software memory part for executing signal conversion processing, programs transferred from a program memory being set in the software memory part. According to this, it is possible to easily cope with a plurality of systems with the same construction.

The transmitting and receiving circuits include a

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demodulator, a modulator and wide-band synthesizer which are controlled by a program stored in the software memory part. According to this, it is possible to cope with a plurality of systems with the same construction by

5   controlling the demodulator, modulator and wide-band synthesizer with a program corresponding to each system, with the same construction.

The detachable module includes a power amplifier, a transmission signal filter and an isolator. According

10   to this, it is possible to select an optimum module for each system, thus preventing the degradation of the characteristic of the power amplifier, transmission signal filter and isolator. Further, since the character deterioration is caused the characteristic

15   with low loss can be maintained and the deterioration of the parts is prevented.

The transmitting and receiving circuits have a software memory part for executing signal conversion processing, programs transferred from a program memory

20   being set in the software memory part and a plurality of programs for commanding signal conversion processing are stored in the program memory. According to this, it is possible to can cope with a plurality of systems by storing a plurality of programs and cope with a service

25   in a district corresponding to the movement of portable telephone set.

The transmitting and receiving circuits have a software memory part for executing signal conversion

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processing, programs transferred from a program memory being set in the software memory part and the software memory provides commands according to a program transferred from the software source memory according to a system switching command. According to this, it is possible to cope with each system by the program command.

According to an aspect of the present invention, there is provided a portable telephone set comprising a transmission function unit and/or a receipt function unit, wherein the transmission function unit for performing a specified transmission process is detachably mounted to a body of the portable telephone set and the operation of the transmission function and/or receipt function is determined on the basis of a predetermined software which is selected.

The predetermined software is selected from a plurality of softwares stored in a memory in the portable telephone set.

The operation of a received signal mixing portion, a demodulating portion and a base band signal processing portion in the receipt function unit is determined on the basis of the predetermined software.

One of a plurality of transmission function units each performing a different frequency band operation is detachably mounted to the body.

The plurality of softwares are stored in a software source memory, one of the plurality of softwares is selected and down-loaded and the operation of the receipt

processing unit is defined by the down-loaded software.

The transmission function unit includes an amplifier, a transmission signal filter and an isolator.

The transmission function unit includes a software memory for storing a plurality of softwares each adapted to each transmission function unit, the predetermined software is defied by loading the software from the software memory in the mounted transmission function unit.

Currently operation system is detected on the basis of demodulated output of the received signal in the receipt function unit and the detected system is displayed.

Other objects and features will be clarified from the following description with reference to attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing a first embodiment of the present invention;

Fig. 2 is a block diagram showing a second embodiment of the present invention;

Fig. 3 is a block diagram showing a third embodiment of the present invention; and

Fig. 4 is a flow chart illustrating the operation of the system detector unit 60.

PREFERRED EMBODIMENTS OF THE INVENTION

Preferred embodiments of the present invention will now be described with reference to the drawings.

An embodiment of the present invention will now be
described with reference to the drawings. The
embodiment to be described is merely an example of the
software portable telephone set according to the present
5   invention.

As shown in Fig. 1, in the software portable
telephone set according to the present invention a
received signal inputted from an antenna 1 is fed through
a received signal mixer 2 and an A/D converter 3 to a
10   demodulator 4. The demodulator 4 is operated according
to software down-loaded in a software memory 5. The
function of the demodulator 4 can be reconfigured afresh
with every software updating.

The down-loaded software is preliminarily stored
15   in a software source memory 6 which is programmed for
each system. In other words, a plurality of software
entities are stored in the software source memory 6, and
one of them is selected and down-loaded in the memory
5 by a software switching controller 5a. The received
20   signal mixer 2 receives a local oscillation signal fed
from a wide-band synthesizer 7 with the frequency thereof
restricted according to the software. As a result of the
demodulation, a digital signal is fed to a baseband signal
processor 8 for signal processing, and then fed out
25   through a man-machine interface 9 to the outside. The
base-band signal processor 9 can be reconfigured afresh
according to the software. On the transmission side,
voice or like signal is inputted along a route converse

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to that of the received signal to a modulator 10. The modulator 10, like the reception side, can be reconfigured afresh for each system according to software.

5   The modulator output is fed to a D/A converter 11 for conversion to an analog signal. The analog signal is fed to a transmission signal mixer 12 for conversion to a carrier frequency, and then fed to a module 20, which includes a power amplifier 21, a transmission signal

10   filter 22 and an isolator 23, to be sent out via the antenna 1. A plurality of modules (20, 30 and 40) are prepared each for each system such as frequency band and used detachably. Since the modules are detachable, it is possible to select best module components such as power

15   amplifier as for each system. It is thus possible to avoid characteristic deterioration due to frequency band increase.

       Fig. 2 is a block diagram showing a second embodiment of the present invention. This embodiment is

20   the same as the previous first embodiment except for that the modules 20, 30 and 40 include respective program memories 24, 34 and 44, in which software for corresponding systems is stored. When a module is mounted, the software thereof is down-loaded in the

25   software memory 5. In this embodiment, the software source memory 6 in the previous first embodiment can be dispensed with, which is desired for reducing the price and size of portable telephone sets.

Fig. 3 is a block diagram showing a third embodiment of the present invention. This embodiment is the same as the previous first embodiment except for that a system detector unit 60 and a system display unit 70 are provided on the transmission side. Fig. 4 is a flow chart illustrating the operation of the system detector unit 60. In Fig. 4, the power of portable telephone set is "on", then a software n (n=1 to n) from a software memory 6 is down-loaded (step S1). Next, the system detector 60 checks whether the output of demodulator exists or not (step S2). When no demodulator output is checked the routine is ended. When the demodulator output exists, a display signal for displaying the system n is generated (step S3) and the routine is ended.

From a display obtained as a result of detection, the user can know systems which can be presently used. Thus, a module complying with the display may be selected and mounted. Thus, even in an unfamiliar land or the like, a system offering services can be known, and communication can be readily set.

As has been described in the foregoing, with the software portable telephone set according to the present invention, it is possible to avoid characteristic deterioration of transmission side components with a detachable transmitting function, and also the transmitting and receiving circuits which are capable of being reconfigured afresh permits coping with a plurality of systems with the same hardware structure.

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It is thus possible to provide a software portable telephone set, which is suited for frequency band coverage increase.

Changes in construction will occur to those skilled
5   in the art and various apparently different modifications and embodiments may be made without departing from the scope of the present invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only. It is therefore
10   intended that the foregoing description be regarded as illustrative rather than limiting.

What is claimed is:

1. A software portable telephone set comprising a detachable transmitting function and transmitting and receiving circuits capable of being reconfigured afresh with software updating, wherein the transmission system is reconfigured afresh in relation to the mounting and demounting of a transmitting function part.

2. The software portable telephone set according to claim 1, wherein the transmitting function is provided by a detachable module for transmitting a modulator output analog signal.

3. The software portable telephone set according to claim 1, wherein the transmitting and receiving circuits have a software memory part for executing signal conversion processing, programs transferred from a program memory being set in the software memory part.

4. The software portable telephone set according to claim 1, wherein the transmitting and receiving circuits include a demodulator, a modulator and wide-band synthesizer which are controlled by a program stored in the software memory part.

5. The software portable telephone set according to claim 1, wherein the detachable module includes a power amplifier, a transmission signal filter and an isolator.

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6. The software portable telephone set according to claim 1, wherein the transmitting and receiving circuits have a software memory part for executing signal conversion processing, programs transferred from a program memory being set in the software memory part and a plurality of programs for commanding signal conversion processing are stored in the program memory.

7. The software portable telephone set according to claim 1, wherein the transmitting and receiving circuits have a software memory part for executing signal conversion processing, programs transferred from a program memory being set in the software memory part and the software memory provides commands according to a program transferred from the software source memory according to a system switching command.

8. A portable telephone set comprising a transmission function unit and/or a receipt function unit, wherein the transmission function unit for performing a specified transmission process is detachably mounted to a body of the portable telephone set and the operation of the transmission function and/or receipt function is determined on the basis of a predetermined software which is selected.

9. The portable telephone set according to claim

8, wherein the predetermined software is selected from a plurality of softwares stored in a memory in the portable telephone set.

10. The portable telephone set according to claim 8, wherein the operation of a received signal mixing portion, a demodulating portion and a base band signal processing portion in the receipt function unit is determined on the basis of the predetermined software.

11. The portable telephone set according to claim 8, wherein one of a plurality of transmission function units each performing a different frequency band operation is detachably mounted to the body.

12. The portable telephone set according to claim 9, wherein the plurality of softwares are stored in a software source memory, one of the plurality of softwares is selected and down-loaded and the operation of the receipt processing unit is defined by the down-loaded software.

13. The portable telephone set according to claim 8, wherein the transmission function unit includes an amplifier, a transmission signal filter and an isolator.

14. The portable telephone set according to claim 8, wherein the transmission function unit includes a
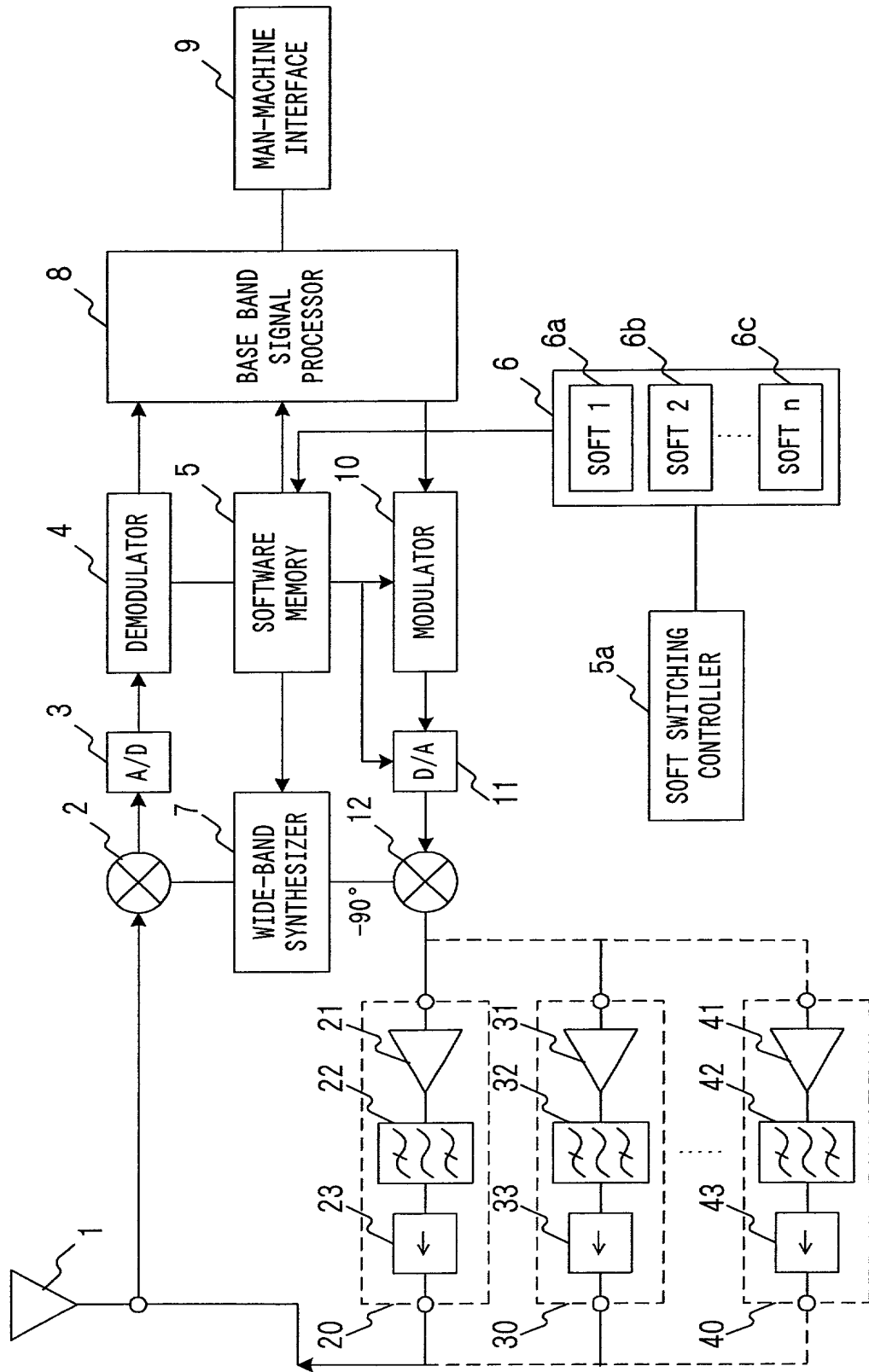
software memory for storing a plurality of softwares each adapted to each transmission function unit, the predetermined software is defied by loading the software from the software memory in the mounted transmission function unit.

15. The portable telephone set according to claim 8, wherein currently operation system is detected on the basis of demodulated output of the received signal in the receipt function unit and the detected system is displayed.

ABSTRACT OF THE DISCLOSURE

Received signal inputted from an antenna 1 is fed via a received signal mixer 2 and an A/D converter 3 to a demodulator 4. The demodulator 4 is operated according to software down-loaded in a software memory 5 from a program memory 6. A demodulator output digital signal is fed to a base-band signal processor 8 for signal processing, and then fed out through a man-machine interface 9 to the outside. On the transmission side, a signal to be transmitted is inputted to a modulator 10 though a route converse to that of the received signal. The modulator output is fed to a D/A converter 11 for conversion to an analog signal, which is in turn fed to a transmission signal mixer 12 for conversion to a carrier frequency, and then fed to a module, which includes a power amplifier 21, a transmission signal filter 22 and an isolator 23, to be transmitted via the antenna 1.

FIG.1

MAN-MACHINE
INTERFACE

9

8

BASE BAND
SIGNAL
PROCESSOR

4

DEMODULATOR

5

SOFTWARE
MEMORY

10

MODULATOR

3

A/D

2

7

WIDE-BAND
SYNTHESIZER

12

-90°

11

D/A

1

20

21

22

23

24

SOFT 1

6a

30

31

32

33

34

SOFT 2

6b

40

41

42

43

44

SOFT 3

6c

FIG.2

FIG.3

FIG.4

```
        ┌──────────────────────────┐
        │ PORTABLE TELEPHONE SET   │
        │       POWER ON           │
        └──────────────────────────┘
                     │
  n=1～n             ▼
        ┌──────────────────────────┐
   ┌───▶│  DOWNLOAD SOFT WARE  n    │
   │    └──────────────────────────┘
   │                 │
   │                 ▼
   │          ╱───────────────╲          PRESENCE
   │         ╱  DEMODULATOR     ╲──────────────┐
   │         ╲    OUTPUT?       ╱              │
   │          ╲───────────────╱               │
   │              │ NONE                       ▼
   │              │              ┌──────────────────────────┐
   │              │              │ OUTPUT DISPLAY OPERATION  │
   │              │              │   SIGNAL OF SYSTEM  n     │
   │              │              └──────────────────────────┘
   │              │                           │
   └──────────────┼───────────────────────────┘
                  ▼
        ┌──────────────────────────┐
        │           END            │
        └──────────────────────────┘
```

Application for United States Patent
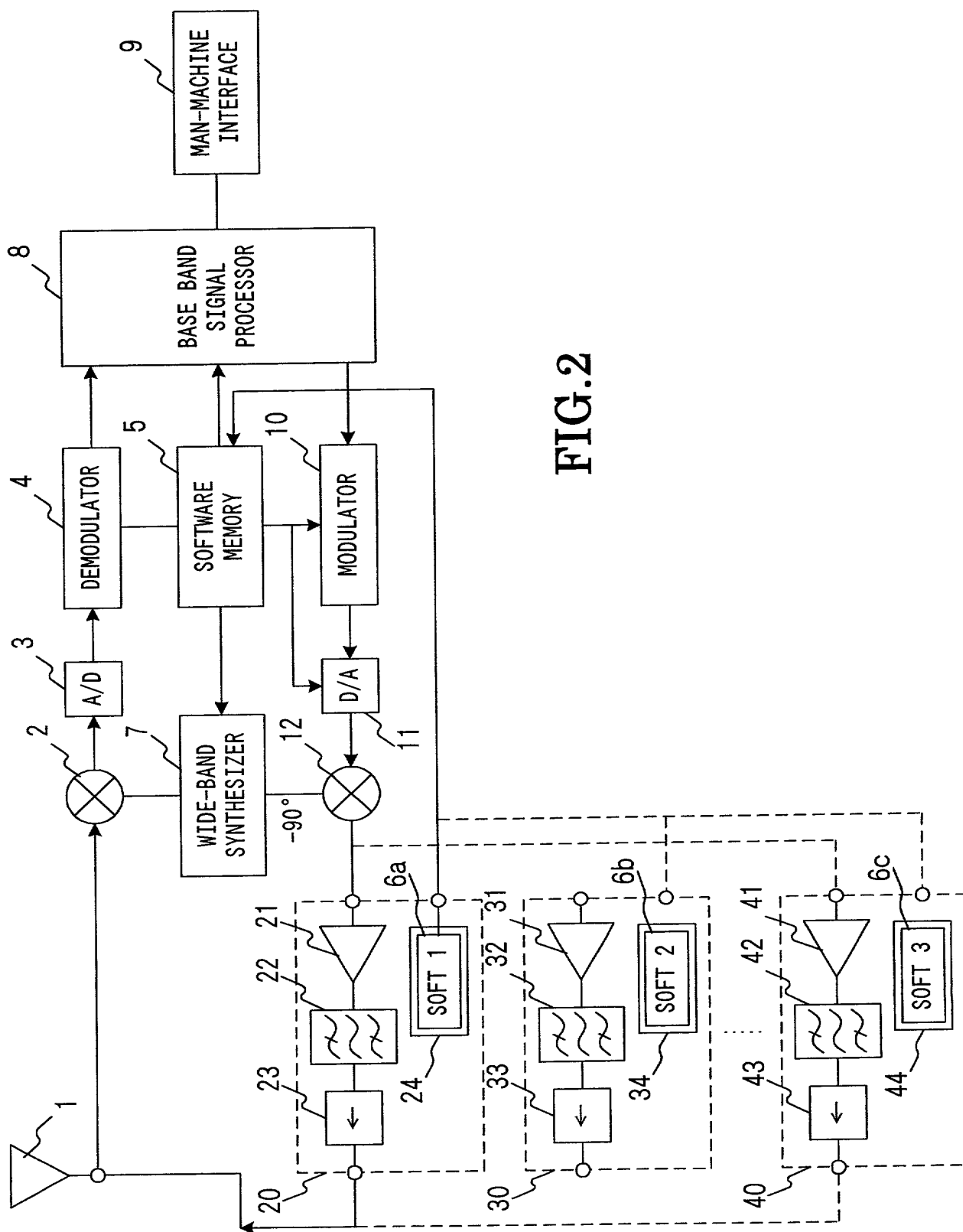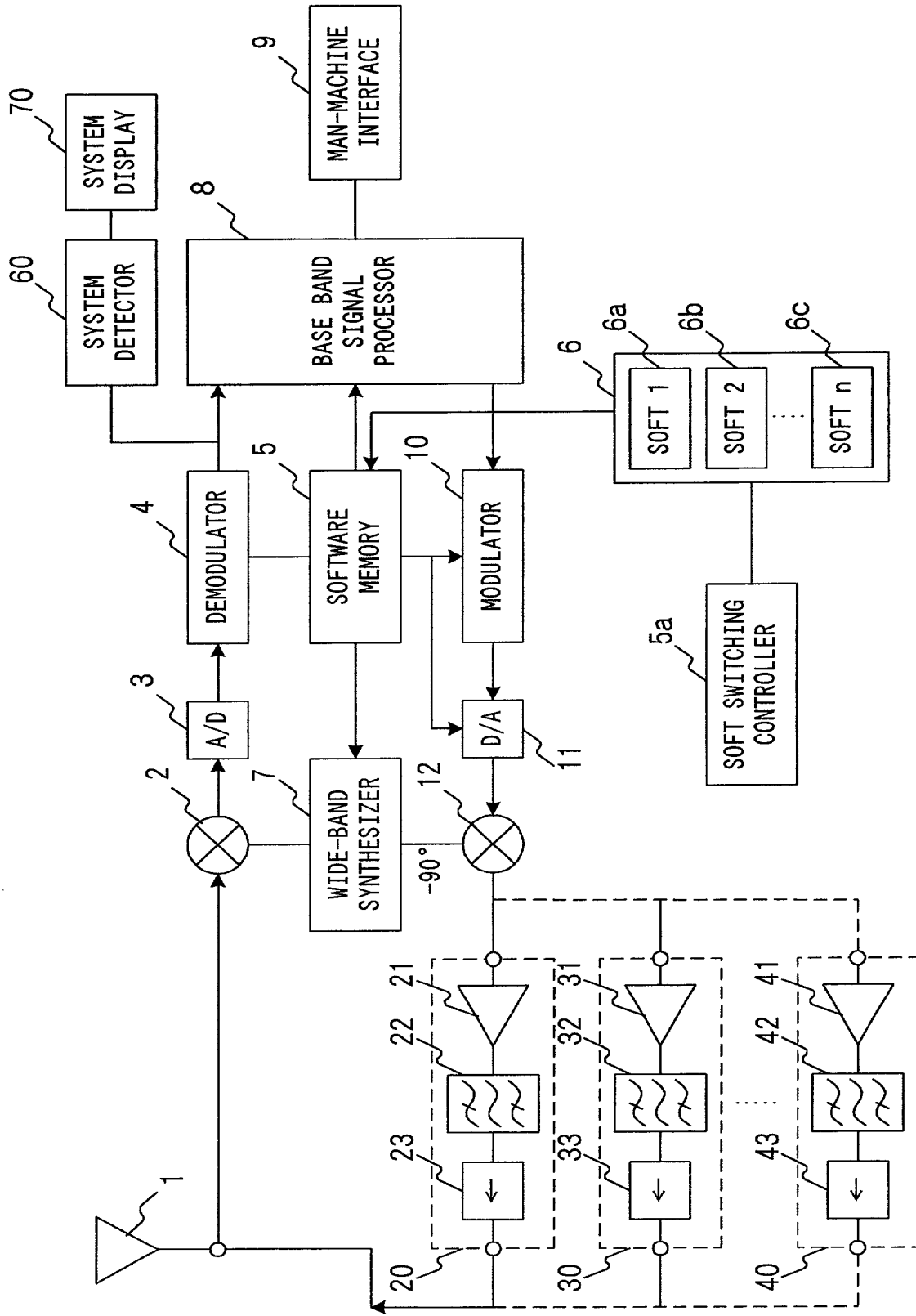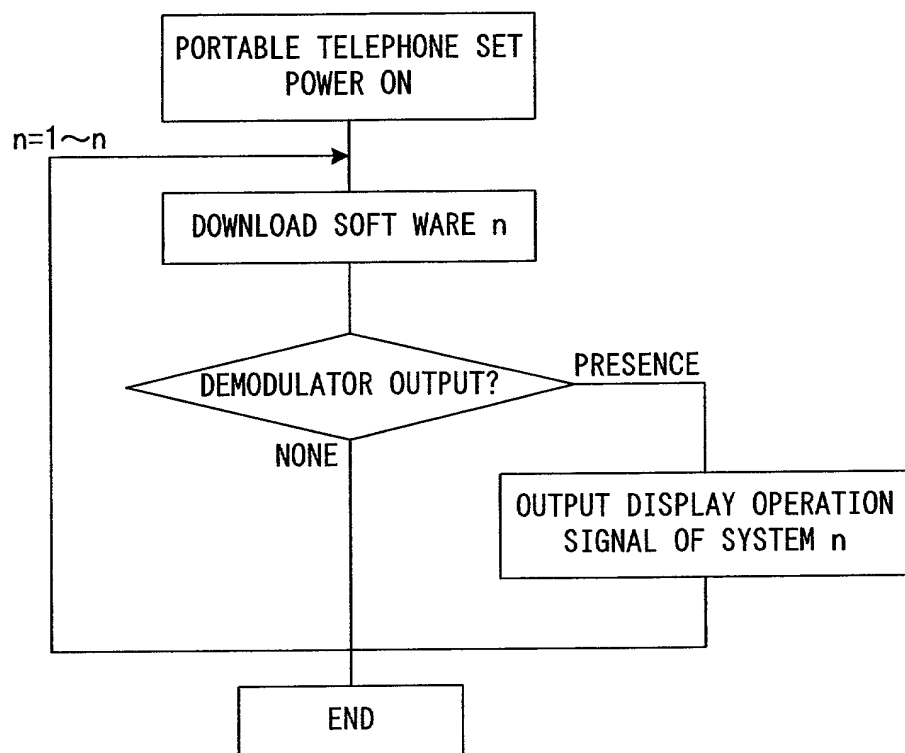
DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: SOFTWARE PORTABLE TELEPHONE SET

the specification of which:

(check
one)

☒ is attached hereto

☐ was filed on _____ , as
Application Serial No. _____
and was amended on _____ .
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56*

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

			priority claimed	
083162/1999	Japan	26/03/1999	X	
(Number)	(Country)	(Day/Month/Year Filed)	yes	no
(Number)	(Country)	(Day/Month/Year Filed)	yes	no
(Number)	(Country)	(Day/Month/Year Filed)	yes	no

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status: patented, pending, abandoned)

Power of Attorney: As a named inventor, I hereby appoint Sean M. McGinn, Reg. 34,386, and Frederick W. Gibb, III, Reg. No. 37,629 as attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. All correspondence should be directed to **McGinn & Gibb, P.C., 1701 Clarendon Boulevard, Suite 100, Arlington, Virginia 22209**. Telephone calls should be directed to McGinn & Gibb, P.C. at **(703) 294-6699**.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful

false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole
or First Inventor____ MASATAKA MITAMA _____

Inventor's Signature _*Masataka Mitama*_____ Date____ 10/03/2000 _____

Residence _____ Tokyo, Japan _____

Citizenship_____ Japanese _____

Post Office Address ___ c/o NEC Corporation, 7-1, Shiba 5-chome, Minato-ku, Tokyo, Japan _____

Full Name of Second

Joint Inventor, If Any_____

Inventor's Signature _____ Date _____

Residence _____

Citizenship _____

Post Office Address _____

Full Name of Third

Joint Inventor, If Any _____

Inventor's Signature _____ Date _____

Residence _____

Citizenship _____

Post Office Address _____

Full Name of Fourth
Joint Inventor, If Any _____

Inventor's Signature _____ Date _____

Residence _____

Citizenship_____

Post Office Address _____

(An additional sheet(s) is/are attached hereto if the present invention includes more than four inventors.)

*Title 37, Code of Federal Regulations, § 1.56:

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith toward the Patent and Trademark Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and (1) it establishes , by itself or in combination with other information, a prima facie case of unpatentability; or (2) it refutes, or is inconsistent with, a position the applicant takes in: (i) opposing an argument of unpatentability relied on by the Office, or (ii) asserting an argument of patentability.